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ing an opposite rotation. For example, l-borneol acetate with a specific rotation of $-44.4°$ could yield ethyl acetate and borneol with a specific rotation of $-37.8°$ l-menthol acetate, with a specific rotation of $-79.4°$, yields l-menthol having a specific rotation of $-50°$. The change of rotation in these two cases is in the same direction as that of l-menthone and would be added to it. In other cases, however, the changes might be in the opposite direction. The change in rotation due to the borneol acetate, for example, can be calculated from the ester number, which is always determined, and the proper correction can be made.

The same idea can be applied to the calculation of the amounts of each of two esters whose identities are known and whose changes of rotation by sodium ethylate are different or of opposite sign. The ester number and change of rotation will give the amount of each. When the mixtures become complex the "unknowns" become too large and the method becomes only qualitative at best.

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MEASURING BIOLOGICAL ACTIONS BY THE FREEZING-POINT METHOD DIRECTLY IN THE SOIL

IT has already been shown that the freezing-point method can be employed to measure (*a*) the concentration of the plant-cell sap directly in the plant tissue,[1] (*b*) the concentration of the soil solution at different moisture contents, directly in the soil,[2] and (*c*) the effect of application of soluble chemical compounds upon the soil solution.[2] In the present note it is desired to announce that the freezing-point method can be used also to study biological activities, by measuring the products of decomposition of organic materials, directly in the soil.

In conjunction with the experiments on the effect of the application of soluble chemical compounds upon the concentration of the soil solution, the effect of the decomposition of various nitrogenous substances was also studied. It has been found that the products of decomposition of these nitrogenous substances increased markedly the concentration of the soil solution, and the magnitude of the increase varied with the nature of the compound and amount employed. In the following table there are presented the results of a single experiment which might serve to typify the character of the general data obtained. This experiment consisted of mixing 0.5 and 1.0 grams of dried blood, cotton-seed meal and animal tankage with 800 grams of soil (equivalent to about 1,250 and 2,500 pounds per 2,000,000 pounds of soil respectively), allowing the mixture to stand in room temperature for five weeks at optimum moisture content and then determining the freezing-point depression, according to the method already described in Tech. Bull. No. 24 of this Station. The percentage of nitrogen contained by the materials is as follows: dry blood, 14.14 per cent.; cotton-seed meal, 7 per cent., and animal tankage, 10 per cent.

TABLE I

Effect of Decomposition of Nitrogenous Substances Upon the Freezing-Point Depression of the Soil Solution

Substance	Grs.	Depression Due to Substance
Dry blood	0.5	.025° C.
" "	1.0	.050°
Animal tankage ...	0.5	.020°
" " ...	1.0	.040°
Cotton-seed meal ...	0.5	.017°
" " " ..	1.0	.030°

The depression in every case is the difference between the depression of the untreated soil or check and that of the treated. In other words, the check was used as a standard.

It will be seen then that the decomposition of these nitrogenous materials increased the depression, and hence the concentration of the soil solution, markedly, and the magnitude of the increase seems to vary with the nature of the material and quantity employed.

In some other experiments the amounts of these nitrogenous materials were used, not in equivalent weight but in equivalent nitrogen content and the freezing-point depression was

[1] *J. Am. Soc. Agr.*, Vol. 8, No. 1, 1916.

[2] Tech. Bull. No. 24, Mich. Expt. Sta., 1916.

measured at various intervals. The results show that dried blood reached its maximum decomposition first, followed by animal tankage and cotton-seed meal, respectively.

The study of soil bacteriology at present consists mainly of either measuring the number of bacteria in the soil, or the kind and intensity of functions of the bacteria. The former study is usually designated as *taxonomic* and the latter as *physiological*.

The taxonomic method is at present not much used in the bacteriological studies of soils, because it has failed to furnish very satisfactory results. The physiological method, however, has proven more successful, at least from the practical standpoint, and is consequently more widely employed.

As already stated, the physiological method aims to measure the kind and physiological efficiency of the organisms by measuring the product of their action upon nitrogenous substances. The products resulting from the decomposition of the nitrogenous materials consist principally of ammonia, nitrite, nitrate amino compounds, etc. Unfortunately the present methods for measuring these end products are for the most part unsatisfactory.

From the results obtained thus far by the freezing-point method on the decomposition of organic materials in soil, it seems possible that this method may be used to great advantage in conducting physiological studies. It is true that the method gives only the total amount of the decomposed soluble material and tells nothing as to the composition of the product. But is not the amount of ammonification, nitrification, etc., taken as criterion of the decomposibility of the substance and the physiological efficiency of the organisms? So may the total depression be taken to represent the same criterion. The decomposition products will undoubtedly exert a solvent action upon the mineral constituents of the soil, and thus influence the total depression. There are evidences, however, which go to indicate that this influence is small (aside from the chemical combination) and consequently the error would be comparatively insignificant. On the other hand, the study will be only comparative.

It appears that the freezing-point method may be used to great advantage in making comparative studies of the decomposibility of various organic substances, in the same kind of soil, or the decomposing power of different classes of soil on the same organic substance, or of the same soil differently treated, etc. Such studies can be conducted very conveniently, under the most natural conditions, and the results thus obtained will doubtless lead to very important and true conclusions concerning the availability of various nitrogenous materials, decomposing power of soils, etc.

Studies along these lines are now being conducted in the laboratory.

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THE SYNONYMY OF OXYURIS VERMICULARIS, THE PIN WORM OF THE HUMAN INTESTINE

In 1758 Linnæus described the pin worm of man under the name of *Ascaris vermicularis*. In 1803 Zeder transferred it to the genus *Fusaria* (*Ascaris* renamed). In 1819 Bremser placed it in *Oxyuris* (type *O. equi*). Baird in 1853[1] published a manuscript name of Leach's *Enterobius vermicularis*.

The species has been generally called *Oxyuris vermicularis* until Stiles in 1905 gave it the generic name of *Oxyurias,* overlooking Leach's name. Now Seurat in 1916[2] proposes the name *Fusarella,* evidently being unaware of the generic names it has received subsequent to *Oxyuris*.

The species clearly does not belong in the same genus with *Oxyuris equi,* and as *Enterobius* is the earliest generic name available, the name of the species is *Enterobius vermicularis* (Linnæus, 1758) Leach, 1853.

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1 "Catalogue of the Species of Entozoa, or Intestinal Worms, Contained in the Collection of the British Museum," p. 108.

2 *Compt. rend. Soc. de biol., Par.*, Vol. 79, p. 67.